

BEFORE THE
Federal Communications Commission
WASHINGTON, D.C. 20554

| | | |
|--|---|----------------------|
| In the Matter of |) | |
| |) | |
| Amendment of Parts 2, 25, and 87 of the |) | |
| Commission's Rules to Implement Decisions |) | |
| From World Radiocommunication |) | ET Docket No. 02-305 |
| Conferences Concerning Frequency Bands |) | |
| Between 28 MHz and 36 GHz and to |) | |
| Otherwise Update the Rules in this Frequency |) | |
| Range |) | |
| |) | |
| Amendment of Parts 2 and 25 of the |) | RM-10331 |
| Commission's Rules to Allocate Spectrum for |) | |
| Government and Non-Government Use in the |) | |
| Radionavigation-Satellite Service |) | |

To: The Commission

REPLY TO OPPOSITION TO PETITION FOR PARTIAL RECONSIDERATION

AirTV Limited ("AirTV"),¹ by counsel and pursuant to Section 1.429 of the Federal Communications Commission's ("Commission") Rules (47 C.F.R. § 1.429), hereby replies to the Opposition to Petition for Reconsideration ("Opposition") filed March 3, 2004, by Wireless Communications Association International, Inc. ("WCA"). In its underlying Petition for Partial Reconsideration ("Petition"), filed on January 22, 2004, AirTV urged the Commission to reconsider, as arbitrary and unsupported, its decision in the *Report and Order* in the above-captioned proceeding to eliminate the Broadcast Satellite Service ("BSS") allocation in the 2520-2670 MHz band from the U.S. Table of Frequency Allocations in Section 2.106 of the Commission's Rules, and to reinstate the BSS allocation in the 2520-2670 MHz band.²

¹ AirTV has developed a global satellite-based Direct-to-Aircraft ("DTA") entertainment and connectivity system that will provide live broadcast television and two-way data services, utilizing the 2535-2655 MHz portion of the 2520-2670 MHz BSS S-band allocation for global downlink services.

² See *Amendment of Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise*

The Commission's removal of the BSS allocation, which was based solely upon its unsupported conclusion that terrestrial systems would face increased costs in mitigating interference, ignores the fact that there is a feasible BSS use of the band that serves the public interest. As demonstrated in AirTV's Comments, Reply Comments, meetings with the Commission, Petition, and now here, AirTV's system will provide valuable DTA broadband services without causing harmful interference to U.S. terrestrial fixed services ("FS") in the 2520-2670 MHz band. BSS and fixed services can both be responsible spectrum users and effectively share use of this band.

In its Opposition, WCA argues against retention of the BSS allocation in the 2520-2670 MHz band. For the following reasons, WCA's arguments, both procedural and technical, are unavailing. AirTV's BSS DTA service in 2520-2670 MHz is feasible and compatible with the fixed service. AirTV's Petition should thus be granted, and the BSS allocation should be restored to its rightful place in the 2520-2670 MHz band in Section 2.106 of the Commission's Rules.

I. WCA OFFERS NO SUPPORT FOR THE COMMISSION'S ERRONEOUS CONCLUSION THAT TERRESTRIAL SERVICES WILL NEED TO MITIGATE INTERFERENCE CAUSED BY AIRTV'S SYSTEM.

A. AirTV's Technical Demonstration Of Interference Compatibility Is Properly Before The Commission.

Contrary to WCA's assertions otherwise,³ AirTV's demonstration of the feasibility of BSS/terrestrial sharing of 2520-2670 MHz – see AirTV's Petition at Attachment 1 – was both properly presented and outcome determinative. Throughout this proceeding, AirTV has maintained, and provided the Commission with evidence of, the fact that operation of AirTV's global system in

Update the Rules in this Frequency Range and Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum for Government and Non-Government Use in the Radionavigation-Satellite Service, 18 FCC Rcd 23426, 23445 (2003) ("Report and Order").

³ WCA Opposition at 10-15.

the 2520-2670 MHz band will not result in harmful interference to U.S. terrestrial fixed services. In its Comments below, AirTV explained and demonstrated that it “was able to design its system to operate within the Power Flux Density (“PFD”) limit mask specified in Table 21[-]4 of the ITU Radio Regulations, assuring compatibility with co-primary terrestrial services.”⁴ In its Reply Comments, AirTV reasserted that its global system “will not cause unacceptable interference to present or future terrestrial services,” citing International Telecommunications Union (“ITU”) and Administration of Canada studies for support.⁵ The study submitted by AirTV in the Petition, in accordance with Commission Rule 1.429, merely buttresses the facts and information previously presented by AirTV.

WCA’s assertion that the AirTV definitive study is untimely ignores the procedural posture of this aspect of the instant proceeding. As AirTV demonstrated in its Petition, the Commission erroneously placed the burden of demonstrating that the BSS at 2520-2670 MHz will not cause unacceptable or worse interference to terrestrial services on AirTV.⁶ The burden actually belongs to the fixed service to show that such interference would be caused and that co-frequency operation is infeasible. When the fixed service, including WCA, failed to meet its burden below, a point on which the Commission materially erred in the *Report and Order*, AirTV proffered its study with the Petition. WCA cannot now be heard to complain that AirTV provided material to satisfy a burden that was improperly shifted to AirTV from WCA itself.⁷

⁴ AirTV Comments at 3, 5-7.

⁵ AirTV Reply Comments at 2-4.

⁶ AirTV Petition at 5-6.

⁷ If anything, WCA’s submission is untimely. Its obligation was to provide supporting material in response to the *NPRM*. In any event, AirTV demonstrates the incorrectness of WCA’s technical assertions in Section I.B. below.

B. WCA's Belated Technical Submission Fails To Rebut AirTV's Showing That BSS/FS Co-Existence Is Feasible In The 2520-2670 MHz Band.

Nothing in WCA's Opposition disproves the facts presented by AirTV demonstrating that operation of its system will not result in unacceptable levels of interference to U.S. terrestrial services.⁸ In fact, WCA's technical showing is largely factually incorrect and unavailing, due to WCA's unreasonable reliance on incorrect and unrealistic antenna data.⁹ WCA's selection of this terrestrial antenna data was a transparently self-serving attempt to portray the AirTV-type BSS system in the worst possible light. The mere fact that WCA made this attempt speaks volumes about its sincerity in the objective of achieving and promoting the efficient use of the spectrum and its willingness as an industry to share and assume the obligations and responsibilities of responsible spectrum use.

The Commission, as an agency obliged to make decisions consistent with the public interest, cannot base its decisions on faulty and misleading data of the type included in WCA's technical submission. The reality, as AirTV has demonstrated before, and as it shows in the responsive Technical Statement it includes in Attachment 1 to this Reply, is that even if the antennas portrayed by WCA were used by terrestrial services in the 2520-2670 MHz band, AirTV's forthcoming DTA BSS system would still satisfy the Isat/N threshold value. There would be no harmful interference caused to present and planned terrestrial services.¹⁰

⁸ WCA Opposition at 11-15.

⁹ See Attachment 1.

¹⁰ One point from WCA's Opposition merits a special note here. In its Opposition, WCA recites that the participation of an AirTV representative in the U.S. preparations for the first international meeting of newly-formed ITU Joint Task Group 6-8-9 ("JTG 6-8-9") somehow connotes that AirTV has endorsed the positions that that wireless-dominated group has produced for this month's JTG 6-8-9 meeting in Geneva, Switzerland. See WCA Opposition at 13. Nothing could be farther from the truth. JTG 6-8-9 was formed in the ITU to develop balanced conditions for the co-existence of satellite and fixed services in the 2500-2690 MHz band. With the adoption of the *Report and Order* in the instant proceeding, the Commission and the other participants in the U.S. effort abandoned all pretext at balance, and proceeded with an agenda that was heavily biased toward the terrestrial interests --notwithstanding the pendency of AirTV's Petition and the non-finality of the flawed removal of the BSS from the 2520-2670 MHz portion of that band. The terrestrial interests in the group have had a field day ever since, and AirTV's participation in the preparations for

II. WCA FAILED TO RESPOND TO MANY OF AIRTV'S ARGUMENTS SUPPORTING RETENTION OF THE BSS ALLOCATION.

WCA's Opposition fails to respond to AirTV's arguments on the merits.¹¹ In its Petition, AirTV fully responded to all the bases enumerated by the Commission for deleting the BSS allocation in the *Report and Order*.¹² Instead of offering relevant counterarguments, WCA largely restates AirTV's own arguments or makes arguments that are inapposite or inapplicable in this proceeding. It over criticizes AirTV, which is seeking reconsideration of the Commission's decision in the *Report and Order*, for not responding to WCA's arguments in comments on the *NPRM*.¹³

As an initial matter, AirTV is under no obligation to respond to WCA or other arguments the Commission did not find persuasive enough below to become a basis for the *Report and Order*. WCA's assertion to the contrary must be rejected.

On matters that AirTV was responsible to address, AirTV demonstrated in its Petition that the Commission acted arbitrarily when it removed the BSS allocation without requiring a technical showing from the allegedly harmed terrestrial services that co-existence among co-primary services is infeasible. In WCA's attempt to counter this proposition, it merely restates what AirTV presented in the Petition. In some instances, materials proffered by WCA support AirTV's position

JTG 6-8-9 has been effectively limited to restraining unjustified proposals, such as Sprint's originally proposed coordination threshold of $Isat/N = -20$ dB (which would represent an infinitesimal .04 dB increase in the noise, and which would have robbed the U.S. of any credibility in the international forum). Realizing the indefensibility of its position, Sprint and its partisans approved a revised but still unreasonable $Isat/N$ figure of -10 dB. The group's bias precluded any consideration of a reasonable $Isat/N$ figure such as -6 dB. The Commission should be cautious in its endorsement internationally of positions that it may have to reverse once the BSS allocation is properly restored in this proceeding, and a properly-balanced approach to JTG 6-8-9 becomes the order of the day once again.

¹¹ In fact, WCA did not substantively respond to AirTV's argument for maintaining footnote NG101. Footnote NG101 is a vestige of old service rules and should be eliminated.

¹² AirTV did not address those arguments advanced by WCA and Boeing that the Commission did not deem to be of any decisional value. Such arguments did not warrant a response. See WCA Opposition at 5.

¹³ WCA Opposition at 4.

that the Commission should not act to delete an allocation absent proof of technical incompatibility.¹⁴

WCA accurately states that the *Radionavigation Order*¹⁵ closely parallels the instant proceeding; however, contrary to WCA's characterization, the Commission's action in the *Radionavigation Order* affirmatively supports AirTV's argument that the Commission should not remove an existing allocation in which interest has been expressed absent evidence of the infeasibility of co-existence between the allocated services.¹⁶ In the *Radionavigation Order* proceeding, the Commission was presented with documentation regarding the infeasibility of co-existence between the space research (deep space) and the radionavigation services, which no party contested. The National Aeronautics and Space Administration ("NASA") did not merely provide "concerns" – it cited an ITU Recommendation that documented the infeasibility of co-existence between space research (deep space) and airborne operations in the radionavigation service, the service the Commission proposed deleting. In addition, NASA stated that "its earth stations can not [sic] be shielded from airborne radio sources operating on frequencies within the sub-band 31.8-32.3 GHz" and that airborne interference sources could "easily overwhelm" its space research operations.¹⁷ Thus, the Commission acted to delete a service allocation from a portion of the band only after demonstrated technical infeasibility of sharing among the primary services. Here, the only technical materials in the record as of the time the Commission deleted the BSS allocation showed that BSS and FS are feasible at 2520-2670 MHz.

¹⁴ See WCA Opposition at 7-10.

¹⁵ *Amendment of Parts 2 and 87 of the Commission's Rules Regarding the Radionavigation Service at 31.8-32.3 GHz*, 15 FCC Rcd 18587, 18590 (2000) ("*Radionavigation Order*").

¹⁶ WCA Opposition at 7-8.

¹⁷ *Radionavigation Order*, 15 FCC Rcd at 18590.

WCA's discussion of the *MVDDS Order* is similarly unpersuasive. After reiterating that the *MVDDS Order* involved the addition of a new service to a band, WCA's discussion ends.¹⁸ WCA ignores the substance of AirTV's argument that the same technical feasibility standard that was applied in that proceeding to support a new allocation should apply in the converse situation of deleting an existing service allocation from a band. In either case, the burden is on the proponent of the change in the table of allocations – a burden WCA and the fixed services have utterly failed to meet here.¹⁹

It is significant that Section 7 of the Communications Act increases the burden that those opposing retention of the BSS allocation must meet in this proceeding. In order to encourage the provision of new services, Section 7 mandates that parties opposing a proposed new technology or service demonstrate that the new service is inconsistent with the public interest.²⁰ Because AirTV's system will provide new global DTA broadband services to the public, Section 7 applies and imposes an additional burden that opponents of new BSS systems in the 2520-2670 MHz band have to meet.

Finally, WCA substantively failed to address AirTV's argument that the U.S.'s international obligations mandate the retention of the BSS allocation in the 2520-2670 MHz band. Specifically, WCA largely ignored AirTV's argument that the direct broadcast satellite ("DBS") service contemplated by the U.S. exemption from its World Trade Organization ("WTO") commitment

¹⁸ WCA Opposition at 8-9 (citing *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz Band*, 18 FCC Red 8428 (2003) ("*MVDDS Order*")).

¹⁹ WCA's reliance on a waiver case for a service application proposing operation on a non-interference basis is misplaced and irrelevant. WCA Opposition at 9-10. A waiver is necessary for new service allocations – not existing allocations. The subject of this proceeding is an existing allocation. AirTV seeks the retention of an admittedly valuable service allocation and not a waiver of the Commission's Rules.

²⁰ 47 U.S.C. § 157.

only includes a subset of the BSS limited to the 12.2-12.7 MHz band, by summarily stating that the WTO commitments are inapplicable.²¹ In support of its position, WCA cites only the fact that the Commission's Further NPRM and Order in the proceeding implementing the U.S.'s WTO commitment did not explicitly label DBS as that subset of BSS using a certain 500 MHz band.²² "DBS" has a specific meaning in the Commission's rules and also in the WTO context. 2.5 GHz BSS is not DBS. Moreover, the *Implementation Order* cited by WCA contains contextual evidence that supports AirTV's position – i.e., the Commission included DBS in the larger category of direct-to-home ("DTH") services, thereby implying that it intended DBS to cover only those broadcast services at 12.2-12.7 MHz intended for home entertainment delivery.²³ AirTV's BSS service is not DTH. WCA's argument in this regard is completely unpersuasive.

III. RETENTION OF THE BSS ALLOCATION AT 2520-2670 MHZ AND ELIMINATION OF NG101 ARE CONSISTENT WITH THE ADMINISTRATIVE PROCEDURE ACT.

In an attempt to prevent consideration of the Petition on its merits, WCA makes an unreasonably narrow reading of the Administrative Procedure Act ("APA") when it argues that the Commission cannot retain the BSS allocation in the 2520-2670 MHz band without restricting use to educational purposes.²⁴ As WCA acknowledges, the APA requires agencies to provide "either the terms or substance of the proposed rule or a description of the subjects and issues involved."²⁵ The

²¹ WCA Opposition at 15.

²² *Id.*

²³ *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States and Amendment of Section 25.131 of the Commission's Rules and Regulations to Eliminate the Licensing Requirement for Certain International Receive-Only Earth Stations*, 12 FCC Rcd 24094, 24133-34 ("*Implementation Order*").

²⁴ WCA Opposition at 5-6.

²⁵ 5 U.S.C. § 553(b)(3).

Commission provided this notification in the *NPRM*, by including a description of its proposal to delete the “FSS and BSS allocations from the band 2500-2690 MHz” and “footnotes NG101 and NG102.”²⁶ In fact, the Commission’s intentions were so clear that several commenters submitted comments on the issue, including AirTV, WCA and Boeing. The status of BSS allocation and footnote NG101 were fully debated and ripe for Commission action.²⁷ As for WCA’s argument that footnote NG101 was not independently primed for decision, AirTV notes that the *NPRM* in this proceeding reflects the Commission’s awareness that the original limitations on satellite and terrestrial use of the band have been overtaken by events, and are effectively vestigial in the case of footnote NG101.²⁸ The note was put into play. By arguing otherwise, WCA attempts to have it both ways – it is attempting to protect operations not contemplated by the Commission’s original allocation by arguing that an equalization of the status in the companion satellite allocation is an impermissible expansion.

The decision of the U.S. Court of Appeals for the D.C. Circuit that WCA cites in support of its procedural argument actually supports AirTV’s position instead.²⁹ In *Kooritzky v. Reich*, the Department of Labor promulgated a rule eliminating the previous practice of permitting the

²⁶ *Amendment of Parts 2, 25, and 87 of the Commission’s Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range and Amendment of Parts 2 and 25 of the Commission’s Rules to Allocate Spectrum for Government and Non-Government Use in the Radionavigation-Satellite Service*, 17 FCC Rcd 19756, 19773 (2003) (“*NPRM*”).

²⁷ Even if it could be argued that the combined retention of the BSS allocation and deletion of footnote NG101 does not reflect the proposed rule, such a rule would be a “logical outgrowth” of the proposed rule.

²⁸ *NPRM*, 17 FCC Rcd at 19772.

²⁹ WCA Opposition at 6-7, n. 31. The Commission precedent cited by WCA is similarly unpersuasive. In the first case, the Commission declined to consider the validity of an auction and frequency *reallocation* in the course of a proceeding to establish licensing rules and procedures. *Amendment of the Commission’s Rules Concerning Maritime Communications and Petition for Rule Making filed by Regionet Wireless License, LLC*, 17 FCC Rcd 6685, 6697 (2002). In the second case, the Commission determined that a frequency *reallocation* is outside of the scope of a proceeding designed to update and revise the text of the Commission’s Rules. *Revision and Update of Part 22 of the Public Mobile Radio Services Rules*, 95 FCC 2d 769, 828 (1983). Here, AirTV urges the Commission to retain an *existing allocation* in the course of a germane proceeding.

prospective employer of an alien to substitute a new alien when the alien named in labor certification became unwilling to accept the job, where the NPRM “contain[ed] nothing, not the merest hint, to suggest that the Department might tighten its existing practice of allowing substitution. Substitution is neither discussed nor mentioned.”³⁰ According to the Court, “[a]nyone reading those proposals would have assumed that [the substitution practice] would not be affected.”³¹ Conversely here, the Commission made two explicit proposals – to delete the BSS allocation and to delete footnote NG101.³² There is no question but that either the allocation, the footnote, or both were to be affected. Throughout this proceeding, AirTV has urged the Commission, in accordance with the APA, to adopt one proposal but not the other.

IV. CONCLUSION

For all of the foregoing reasons, the arguments WCA sets forth in its Opposition are without merit, and the Commission should restore the BSS allocation at 2520-2670 MHz to Section 2.106 of the Commission’s Rules – without Footnote NG101 – as called for in the Petition.

Respectfully submitted,

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³⁰ 17 F.3d 1509, 1513 (D.C. Cir. 1994).

³¹ *Id.*

³² *NPRM*, 17 FCC Rcd at 19773.

ATTACHMENT 1

TECHNICAL STATEMENT

The technical analysis and case studies presented in WCA's Opposition to AirTV's Petition for Partial Reconsideration contain numerous errors and misrepresent the impact of BSS transmissions on existing terrestrial systems in the 2520-2670 MHz band. In each case, the terrestrial antenna data is faulty and has been skewed by WCA in an attempt to project a worst-case scenario. Such an approach leads to incorrect conclusions that are unrealistic, self-serving, and completely contrary to the objective of promoting efficient use of spectrum. AirTV has reassessed each case in WCA's analysis, and presents a revised Isat/N analysis that is properly based on sound engineering judgment. This analysis reconfirms AirTV's position that its direct-to-aircraft BSS system will not cause harmful interference to any present or future terrestrial service in the 2520-2670 MHz band.

Interference Analysis for a 24 dBi ITFS/MDS Parabolic Antenna

The WCA analysis for the 24 dbi gain parabolic antenna is misleading and uses anomalous antenna performance data in an attempt to exhibit a worst-case scenario. The elevation pattern shown for the California Amplifier (QLP 130094/130135) is not consistent with the performance of a typical 24 dbi parabolic antenna and, in fact, is not consistent with the published data in the California Amplifier website which states that the typical sidelobe performance of this antenna is better than -20 dB. At 20 degrees from boresite, beyond the main beam, the antenna gain would typically be no higher than 4 dbi and not 8.77 dbi as used in the WCA analysis. Measured performance data was obtained on two comparable 24 dBi parabolic reflector antennas, an Equinox SA 2424 and a Doradus 24SD27. Both antennas show elevation pattern performance that is 20 dB below the peak gain at 20 degrees from the beam peak axis. This is typical performance for this class of antenna.

An Isat/N analysis was performed using an elevation pattern contour derived from the average performance of the Equinox and Doradus antennas. The analysis was performed for both the PFD limits for the 2520-2670 MHz band in Article 21, Table 21-4 of the ITU Radio Regulations, and the AirTV PFD values. The results are shown in Tables I and II. The analysis also contains the impact of polarization mismatch between the AirTV signal and the receiving antenna. The AirTV satellite will radiate a circularly polarized signal with an axial ratio of .75 dB. The coupling loss between a CP wave and a linear (or quasi elliptically) polarized antenna can be

readily calculated when the axial ratios of both the incoming wave and the receiving antenna are known. Typical linear polarization axial ratio performance for a 24 dBi gain parabolic antenna was used. As exhibited in the analysis the coupling loss will vary as the polarization purity of the receive antenna degrades at off-axis angles from the antenna boresite. Based on information obtained from California Amplifier an antenna insertion loss of 0.5 dB was also included to account for loss through the feed and the distribution cable to the low noise amplifier.

Table I shows the results using the PFD limits in Article 21, Table 21-4. For this deterministic analysis, the threshold limit of -6dB is exceeded and a more extensive probabilistic analysis incorporating actual terrestrial operating conditions would need to be performed to assess the true impact on the terrestrial services. Table II shows the results when the AirTV PFD values are used. At all elevation angles, the calculated Isat/N is comfortably below the coordination threshold limit of -6 dB as well as the more pessimistic threshold of -10 dB.

When the Isat/N threshold is exceeded as in Table I, a more detailed probabilistic analysis should be employed to determine the impact on the receiving sites. This analysis will include variations in the location and pointing of the ground stations (note that the results in Table I are a worst case scenario when the ground terminal is aligned directly with the longitude of the satellite), the system link margin, and other factors that could determine the overall availability of the terrestrial service. For example, in MMDS and ITS television services that use high gain (24 dBi) antennas, it can be shown that even when values of Isat/N exceed the -6 dB threshold, the impact on the service is minimal. These video carriers typically run with high C/N ratios of 20 dB or more and operate with more than 10 dB of margin. An Isat/N = -6 dB would, in the worst case, increase the receiver noise floor by 1 dB, reducing the conservative system margin by 1 dB and only slightly impacting the availability.

A recent submission by Australia (Document 6P/14-E, 16 Sept. '03) to ITU Working Party 6P includes a probabilistic analysis to determine the simultaneous impact of a GSO and NGSO BSS satellite on a series of video collection station receivers located within Australia. The study assumes that both the GSO and NGSO satellites are operating at the maximum PFD limits from Article 21, Table 21-4. The collection station antennas are 21 dBi parabolic reflectors similar to those used in the above analysis. The results of the probabilistic analysis show that Isat/N has to

be greater than -5 dB before any significant loss in availability can be observed at the collection station sites. The results further show that the probability of an availability loss of 0.132% (for 99.5% design availability) was approximately 2%.

To assess the impact on terrestrial system availability from BSS transmissions operating at the Table 21-4 PFD levels, a similar probabilistic analysis can be performed on a distribution of 24 dbi reflector antennas located throughout the United States. One would anticipate results similar to those contained in the Australian study. The system availability would be slightly impacted, but acceptable terrestrial service could still be maintained. A probabilistic analysis would not be required for the AirTV PFD level since the Isat/N threshold is not exceeded.

Interference Considerations for a Navini Ripwave Antenna

The Navini Ripwave antenna used in the second case study in the technical statement attached to WCA's Opposition is an active array design that uses RF beamforming and digital signal processing technology to both electronically focus the radiation pattern of the base station antenna and to mitigate the impact of unwanted signals. The Navini website states, "when using adaptive beamforming, the Navini system can be configured to avoid radiating energy in any specific direction further mitigating interference." In a white paper found on the Navini website, the antenna system is described as follows: "when signals from a certain CPE (customer premise equipment) is to be extracted, spatial filter or space time processing is used to suppress the interference from other CPEs. It has been demonstrated that the source signal can be completely covered by the interference source and the Navini's system can still compensate and demodulate the signal." This type of antenna system is significantly less susceptible than others to interference, and consequently was a poor example for WCA to use. Systems like this one that employ the latest technology in adaptive antenna beamforming coupled with interference mitigating spread spectrum modulation would be virtually unaffected by BSS transmissions at the levels produced by AirTV's system.

The concept of antenna gain in an active adaptive array with digital processing is not well defined since one cannot easily separate the passive antenna performance from the effect of the active electronics. As such, gain is typically associated only with passive antennas. Despite this, in the Navini specifications the antenna is described as having a gain of 8 dBi and omni

directional performance. Based on this information and the physical description of the antenna, it be inferred that the basic antenna design concept is a collinear array of elements that Navini has modified with active electronics. The passive version of the collinear array is a common type of antenna used for LANs and other wireless systems. An In Path Model 2437AA is a “passive” 2.5 GHz collinear array antenna with a gain of 7.5 dBi gain and a pattern that is omnidirectional in the azimuth plane. The performance of this antenna would be very similar to the pure passive RF performance of the Navini antenna with the specialized active electronics and interference mitigating processing electronics eliminated. Using the measured elevation pattern of this antenna, an Isat/N analysis was performed and the results are shown in Tables III and IV. Table III also shows the elevation pattern envelope that is used. Note that at a 20 degree elevation angle, the gain would be 10 dB below the 7.5 dBi omnidirectional gain in the azimuth plane, which is the plane of constant gain. The gain in the elevation plane follows a cosinusoidal pattern with a maximum at 0 degrees and a null at 90 degrees. Consequently the data contained in the WCA analysis is incorrect.

The results in Tables III and IV show that the passive version of this antenna has sufficient rejection to ensure that Isat/N is comfortably below the -6 dB threshold for both AirTV’s PFD values and the Table 21-4 limits. When Navini’s interference suppression electronics is incorporated into the system, the interference level is further reduced.

Consideration of Future 3G Services

Future 3G antennas will generally have lower off-axis gain than the parabolic antennas analyzed above, and consequently are less likely to be affected by BSS transmissions. Anomalous scenarios where antennas are mispointed or designed to have maximum gain at high elevation angles – rather than toward the intended users -- should be analyzed on a case-by-case basis and assessed for the probability of such a scenario. These unrealistic and highly improbably worst-case scenarios promote spectrum inefficiency and should not be allowed to be used as impediments to shared BSS and terrestrial use of the band.

Conclusions

The results presented in WCA’s Opposition are erroneous and are based on false or misleading assumptions of terrestrial antenna performance. For the case of the parabolic reflector, the

elevation pattern performance is anomalous and not typical for this type of antenna. Despite this, the emissions produced by the AirTV system would still be under the Isat/N threshold value. Using a more typical pattern, it was demonstrated that AirTV comfortably meets the Isat/N threshold requirements. Probabilistic analyses for higher power BSS system would also show that they would have minimal impact on terrestrial services using this type of antenna. The Navini antenna was a poor choice by WCA to attempt to prove its point. The analysis uses an incorrect assumption about the gain in the elevation plane. The antenna's interference canceling capability ensures reliable service in the presence of unwanted CPE or satellite transmissions.

AirTV continues to maintain and demonstrate that its direct-to-aircraft BSS system causes no harmful interference to present and planned terrestrial services in the 2520-2670 MHz band. Co-existence between systems such as AirTV and the terrestrial service results in a better overall utilization of the spectrum with no harmful impact to either service.

| Angle | 0 | 5 | 10 | 15 | 20 | 30 | 40 | 50 |
|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| PFD | -128 | -128 | -124.25 | -120.5 | -116.75 | -113 | -113 | -113 |
| Gain | 24 | 20 | 8 | 5 | 4 | 0 | 0 | 0 |
| Feed & Polar. Loss | 3.5 | 3.5 | 2.5 | 2.5 | 2.5 | 2 | 2 | 2 |
| I | -137.23 | -141.23 | -148.48 | -147.73 | -144.98 | -144.73 | -144.73 | -144.73 |
| Noise Floor | -141 | -141 | -141 | -141 | -141 | -141 | -141 | -141 |
| Isat/N | 3.77 | -0.23 | -7.48 | -6.73 | -3.98 | -3.73 | -3.73 | -3.73 |

Table I – Isat/N into Typical 24 dbi Parabolic Antenna – Table 21-4 PFD

| Angle | 0 | 5 | 10 | 15 | 20 | 30 | 40 | 50 |
|-----------------------|---|---|----|----|---------|---------|---------|---------|
| PFD | | | | | -126.9 | -124 | -121.5 | -123.1 |
| Gain | | | | | 4 | 0 | 0 | 0 |
| Feed & Polar. Loss | | | | | 2.5 | 2 | 2 | 2 |
| I | | | | | -155.13 | -155.73 | -153.23 | -154.83 |
| Noise Floor | | | | | -141 | -141 | -141 | -141 |
| Isat/N | | | | | -14.13 | -14.73 | -12.23 | -13.83 |

Table II – Isat/N into Typical 2.4 dbi Parabolic Antenna – AirTV PFD

| Angle | 0 | 5 | 10 | 15 | 20 | 30 | 40 | 50 |
|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| PFD | -128 | -128 | -124.25 | -120.5 | -116.75 | -113 | -113 | -113 |
| Gain | 8 | 7 | 4 | -2 | -2 | -4 | -5 | -7 |
| Feed & Polar. Loss | 3.5 | 3.5 | 3.5 | 3 | 2.5 | 2 | 1.5 | 1.5 |
| I | -153.23 | -154.23 | -153.48 | -155.23 | -150.98 | -148.73 | -149.23 | -151.23 |
| Noise Floor | -139.5 | -139.5 | -139.5 | -139.5 | -139.5 | -139.5 | -139.5 | -139.5 |
| I/N | -13.73 | -14.73 | -13.98 | -15.73 | -11.48 | -9.23 | -9.73 | -11.73 |

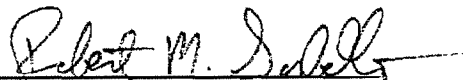
Table III – Isat/N into a Typical 8 dbi Omni Array – Table 21-4 PFD

| Angle | 0 | 5 | 10 | 15 | 20 | 30 | 40 | 50 |
|-----------------------|---|---|----|----|---------|---------|---------|---------|
| PFD | | | | | -126.9 | -124 | -121.5 | -123.1 |
| Gain | | | | | -2 | -4 | -5 | -7 |
| Feed & Polar. Loss | | | | | 2 | 2 | 1.5 | 1.5 |
| I | | | | | -160.63 | -159.73 | -157.73 | -161.33 |
| Noise Floor | | | | | -139.5 | -139.5 | -139.5 | -139.5 |
| I/N | | | | | -21.13 | -20.23 | -18.23 | -21.83 |

Table IV – Isat/N into a Typical 8 dbi Omni Array – AirTV PFD

TECHNICAL CERTIFICATE

I hereby certify, under penalty of perjury, that I am the technically qualified person responsible for the preparation of the technical information contained in the foregoing Reply of AirTV to the Wireless Communications Association International's Opposition Petition for Partial Reconsideration and associated Technical Statement, that I am familiar with the relevant Parts of the Commission's Rules, and that the technical information referenced above is complete and accurate to the best of my knowledge and belief.

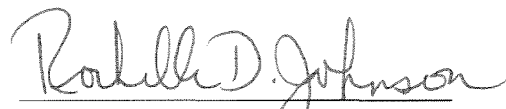
By: 
Robert M. Sorbello
Senior Vice President, Engineering and Technology
AirTV Limited

Dated: March 17, 2004

CERTIFICATE OF SERVICE

I, Rochelle D. Johnson, hereby certify that a true and correct copy of the foregoing Reply to Opposition to Petition for Partial Reconsideration was sent by first-class postage prepaid mail this 17th day of March, 2004 to the following:

Paul J. Sinderbrand
J. Wade Lindsay
Wilkinson Barker Knauer, LLP
2300 N Street, N.W., Suite 700
Washington, DC 20037-1128


Rochelle D. Johnson